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<i>The American Association for the Advancement of Science:</i>	
<i>The Seattle Meeting of the Pacific Division:</i> DR. J. MURRAY LUCK	143
<i>Scientific Events:</i>	
<i>Research in Tropical Medicine; The Second International Forestry Congress; Standard Tests for Soils Used in Engineering; Research Appointments at Yale University</i>	149
<i>Scientific Notes and News</i>	152
<i>Discussion:</i>	
<i>Drought and the Fungous Flora of Colorado:</i> DR. P. F. SHOPE. <i>The Fresh-water Medusa in Louisiana:</i> PERCY VIOSCA, JR., and M. D. BURKENROAD. <i>A Marine Tenement:</i> DR. LOUISE M. PERRY. <i>A Gonad Parasite of the Starfish:</i> G. F. M. SMITH. <i>The First Record of a Dinosaur from the West Coast:</i> CURTIS J. HESSE and S. P. WELLES. <i>Proposed Suspension of Rules of Nomenclature in the Case of Bohadsch, 1761:</i> DR. C. W. STILES	155
<i>Scientific Books:</i>	
<i>The Diary of Robert Hooke:</i> PROFESSOR CHARLES A. KOFOLD	158
<i>Reports:</i>	
<i>Destruction of the Great Western Ranges:</i> DR. A. F. WOODS	159
<i>Special Articles:</i>	
<i>Investigations on Polyporus Schweinitzii Fr.:</i> PROFESSOR HARLAN H. YORK, DR. ROBERT E. WEAN and DR. THOMAS W. CHILDS. <i>Prolongation of the Corpus Luteum in the Pseudopregnant Rabbit:</i> DR. WILLARD M. ALLEN and DR. GEORGE P. HECKEL. <i>Some Possible Effects of Nursing on the Mammary Gland Tumor Incidence in Mice:</i> DR. JOHN J. BITTNER. <i>Bone Ash in Prevention and Healing of Experimental Rat Rickets:</i> PROFESSOR THEODORE F. ZUCKER	160
<i>Scientific Apparatus and Laboratory Methods:</i>	
<i>Preparation of Methionine-free Natural Leucine:</i> S. W. FOX. <i>A Different Principle in the Continuous Renewal of Culture Solution:</i> DR. ROBERT P. MARSH. <i>A Convenient Retractor for Use in Operations and Dissections of Small Sized Animals:</i> PROFESSOR PAUL WEISS	163
<i>Science News</i>	7

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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE SEATTLE MEETING OF THE PACIFIC DIVISION

By Dr. J. MURRAY LUCK

SECRETARY

THE twentieth annual meeting of the Pacific Division and its affiliated societies was held at the University of Washington, Seattle, from June 15 to 20, 1936. The meeting was unique in respect to the number of societies participating and in total registration; twenty-four affiliated societies joined in the meeting and 779 members and guests registered, thus equalling, precisely, the record established at the Los Angeles meeting of last year. Analysis of the attendance reveals that 398 of those who registered resided in the state of Washington, 150 in California, 92 in Oregon, 50 in British Columbia and 16 in Idaho. Of the total, 712 attended from within the territory of the Pacific

Division, and 67 from elsewhere in the United States, central Canada and abroad.

The meeting coincided with the university's celebration of the seventy-fifth anniversary of its founding, to which several of the participating societies gave special recognition. In particular, the American Mathematical Society provided in its program for invited addresses by three distinguished alumni of the university.

The establishment of the university goes back to 1861. For almost 50 years the university occupied a site in what is now the center of downtown Seattle. On conclusion of the Alaska-Yukon-Pacific exposition

of 1909, the exposition buildings and grounds were made available to the university, which then proceeded to move from the downtown area to its new and beautiful site. Those who attended the divisional meeting will not soon forget the spacious campus with its gentle partly wooded slopes reaching towards the shores of Lake Washington and Lake Union, the verdure of its lawns and gardens, the commanding view of majestic Mount Rainier to the southeast, and the beautiful Tudor-Gothic buildings which house the expanding activities of the university.

Supplementary to the formal divisional programs and to the sessions of the participating societies, the university, through its committees on arrangement, made excellent provision for the entertainment of its guests: A general reception tendered by the president, Dr. Lee Paul Sieg, and Mrs. Sieg on Tuesday afternoon; a tour of the campus on Wednesday morning, providing opportunity to enjoy the great variety of native and exotic trees and shrubs growing on the campus, as well as to visit the university greenhouses and drug garden; inspection of the excellent anthropological collection of native Indian materials in the Washington State Museum and a visit to the splendidly equipped Oceanographic Laboratories and research ship *Catalyst* on Wednesday; afternoon tea in the Sylvan Theater on Thursday; and inspection of several special exhibits of unusual interest in the Henry Art Gallery on Friday. A number of attractive excursions were also arranged: An afternoon boat trip along the Seattle water front; inspection of one of the large refrigeration, cold-storage and food-preservation plants in the city; a trip of botanical interest to Esperance bog; inspection of one of the large red cedar saw mills; an all-day trip to Mount Rainier and Paradise Valley; and two-day visits to the Oceanographic Laboratories at Friday Harbor, to Vancouver Island and the Olympic Peninsula, to Skagit Power Dam and to the great engineering projects at Grand Coulee High Dam and Bonneville Dam.

The scientific sessions consisted largely of programs of contributed papers arranged by the participating affiliated and associated societies, supplemented, however, by several symposia of interest to two or more societies and sessions of general interest arranged by the division. The latter consisted of a symposium on oceanography, a series of surveys of current research and three evening addresses. The symposium on oceanography consisted of four addresses as follows: "Marine Biology," C. McLean Fraser, Department of Zoology, University of British Columbia, Vancouver, B. C.; "Chemical Oceanography," E. G. Moberg, Scripps Institution of Oceanography, La Jolla, California; "Fisheries," W. F. Thompson, International Fisheries Commission, Seattle, Washington; "Hydro-

graphic Survey," O. W. Swainson, U. S. Coast and Geodetic Survey, Seattle, Washington.

Under "Research Announcements," the progress of scientific research in four selected fields was reviewed. W. E. Harper, director of the Dominion Astrophysical Observatory in Victoria, spoke upon "Stellar Spectroscopy"; D. R. Hoagland, of the University of California, on "Plant Nutrition"; and E. L. Packard, of Oregon State College, on "Paleontology." R. J. Williams, of Oregon State College, invited to prepare a review on "The Chemistry of Growth-Promoting Principles," was detained from attending the meeting; his paper was read by A. R. Davis, of the University of California.

The evening addresses, three in number, were delivered to appreciative audiences, which filled Guggenheim Hall to capacity. F. K. Kirsten, professor of aeronautical engineering at the University of Washington, described, with many interesting demonstrations, current research in the field of low voltage illumination with rare gases and metallic vapors. Prior to Dr. Kirsten's address, President Lee Paul Sieg, on behalf of the University of Washington, welcomed the members of the association and the affiliated societies to the university. R. C. Tolman, president of the division and professor of physical chemistry at the California Institute of Technology, gave an illustrated lecture on "The Present Status of Cosmology," in which present cosmological theories were developed historically. The concluding address was delivered by F. C. Mann, professor of experimental surgery at the University of Minnesota and director of the Institute of Experimental Medicine at the Mayo Foundation, on the topic "Methods of Medical Progress."

Meetings of the executive committee of the division were held daily and general business sessions on the evenings of Wednesday and Thursday. The affiliation committee also met on Wednesday. Dr. Herbert M. Evans, of the Institute of Experimental Biology, University of California, Berkeley, was elected to the presidency of the division for the ensuing year. Dr. Paul W. Merrill, of the Mount Wilson Observatory, was elected to the executive committee in succession to H. D. Babcock on completion of his five-year term of office. R. E. Clausen and J. Murray Luck were re-elected as vice-president and secretary-treasurer, respectively. The constitution of the division, extensively revised to provide for government by a council instead of by an affiliation committee and general business session, was approved. The following schedule of future meetings was announced: 1937—Denver (national meeting); 1938—Southern California; 1939—Bay Region; 1940—Pacific Northwest (national meeting).

The local arrangements for the meeting were in charge of a general committee consisting of: A. F. Carpenter, *Chairman*; W. L. Beuschlein; B. H. Christian; G. E. Goodspeed; B. L. Grondal; J. E. Guberlet; E. R. Guthrie, *Secretary*; D. H. Loughridge; C. E. Magnusson; R. C. Miller; H. E. Smith, and E. B. Stevens. Much of the success of the meeting was due to the excellent work of this committee.

SESSIONS OF THE AFFILIATED SOCIETIES

Twenty-four of the affiliated and associated societies participated in the meetings, and 487 papers were presented. The reports of the various sessions follow.

AMERICAN MATHEMATICAL SOCIETY

(Report by T. M. Putnam and R. D. James)

The three hundred and thirty-third meeting of the American Mathematical Society was held jointly with the Pacific Division of the American Association for the Advancement of Science at the University of Washington on Thursday, June 18. At the time of this meeting, the University of Washington was commemorating its seventy-fifth anniversary and, as a part of this celebration, the department of mathematics held a reunion of its alumni under the joint auspices of the American Mathematical Society and the University of Washington. As a feature of this event, three alumni of the University of Washington gave invited addresses as follows: Professor H. P. Robertson, "Geometry and Physical Space-time"; Professor E. T. Bell, "Highlights of Mathematical Biography"; Professor Harold Hotelling, "Correlated Vectors."

The morning session, presided over by Professor A. F. Carpenter and Professor E. T. Bell, was devoted to the general program of the American Mathematical Society, and was concluded by the address of Professor Robertson. The afternoon session was presided over by Professor Milne, of Oregon State College. The features of this session were the addresses by Professors Bell and Hotelling.

Luncheon for members and their guests was held at the Seattle Yacht Club, during which Professor A. R. Jerbert read a brief history of the department of mathematics of the University of Washington. About fifty persons were in attendance at the meeting, and thirty-two papers were presented.

AMERICAN METEOROLOGICAL SOCIETY

(Report by Phil E. Church)

In "Weather Cycles and Their Causes," H. P. Gillette discussed two groups of weather cycles: those which are harmonic with the earth's orbital period and those harmonic with the sun-spot cycle. He considers both the earth and the sun to be surrounded by gyrat-

ing electron shells which permit or retard the reception of sun-emitted electrons by the earth's atmosphere. Using varve clay and Sequoia tree-ring data he finds cycles of 23, 5.72 and 2.8 years which are not related to the 11-year sun-spot cycle. F. P. Keen showed the relation of drought periods in Oregon to the destruction of pines by the bark beetle. During dry cycles, when trees make slow growth and their resistance is low, wide-spread damage occurs. His investigations covered 600 years of tree rings.

Three papers dealt with air masses. R. A. Dightman gave an analysis of conditions attendant with the passage of warm tropical Pacific air masses over Spokane from aerological data and soundings. W. C. Jacobs showed that important ceiling-height changes occur within short intervals from waves developed in the passage of air masses. A. B. Carpenter gave an analytical description of a warm front which passed Portland on January 21, 1935, and showed the attendant temperature changes which occurred as far east as Helena.

In a group of papers on winds, L. C. Fisher illustrated that greater wind velocities have been recorded at each of the five progressively higher locations at which the Weather Bureau anemometer has been placed in Seattle. C. P. Elford brought out the close relationship of the southeast wind with the hours of cooling in discussing the local mountain and valley breeze of Boise, Idaho. The relation of wind velocity in the Columbia Gorge to the pressure differences between Hood River and Portland, as illustrated by the easterly gales of December, 1935, was graphically portrayed by D. C. Cameron. For twelve days the average hourly velocity was 38.2 miles with a maximum velocity, estimated because the instruments had previously been blown away, of 120 miles. No less than 34,000 cubic miles of air passed through the gorge which lowered the air mass of the Columbia Basin about 60 feet a day, the thickness at which cooling of 10 to 15 degrees occurred.

Three papers on Alaskan climate were read: "Airway Weather Reports in Relation to Commercial Aviation in Northwestern Alaska," by T. B. Hayward; "Meteorological Summary for 1935 at Fairbanks," by R. L. Frost; and a history of the Fairbanks office, "Six Years a First Order Weather Station in the Interior of Alaska," by J. W. Paul. Other climatic papers included discussions of the Rogue River Valley climate in relation to the pear industry, by W. P. Merriam; the early morning temperatures of Seattle after a clear calm night, by P. E. Church; and a graphic description by E. L. Wells of the floods and cold weather of the Pacific Northwest during 1861-62. During this winter the

Columbia was closed above Vancouver, Washington, by ice for more than two months.

Included in the group of papers on precipitation and related fields was an informative discussion of stream-flow forecasting from snowfield surplus for the Skagit River, which furnishes the power for the Seattle City Light Department. J. Jacobs, of the Washington State Planning Council, in analyzing the relation of rainfall to runoff brought out some interesting precipitation extremes. The minimum record for the state is 3.75 inches at White Swan for 1930. In the lee of the Olympics the average for Sequim is 15 inches. The highest actual record is 186.04 inches at Wynoochee Oxbow for 1933. From the discharge of the Wynoochee River, which amounts to an annual precipitation of 192.8 inches for the whole valley, and allowing 25 inches for transpiration by the forest cover, he calculates that the higher altitudes of the southwest slope of the Olympic Mountains receive at least 270 inches a year.

AMERICAN PHYSICAL SOCIETY

(Report by Paul Kirkpatrick)

On Wednesday morning a symposium of four papers on x-ray was presented. Dr. J. W. M. DuMond, of the California Institute of Technology, described recent attempts to uncover sources of error in the method of determining the electronic charge by measuring x-ray wave-lengths by diffraction from crystals and from artificial gratings, and also presented preliminary results on an x-ray determination of the relation of h to e . Dean F. K. Richtmyer, of Cornell University, president of the American Physical Society, discussed the variation of the wave-length and intensity of certain x-ray satellites with atomic number, presenting new measurements obtained with the vacuum double spectrometer. Dr. R. R. Newell, of Stanford University Hospitals, compared available methods of physical specification of x-ray dosage, illustrating his conclusions with a large number of experimental data. Professor F. Bloch, of Stanford University, commented upon theories of the excitation of x-ray levels by electron collision and their application to recent measurements.

The Astronomical Society of the Pacific joined the Physical Society in a session on Wednesday afternoon at which Professor Carl Anderson, of the California Institute of Technology, summarized recent cosmic-ray studies, and Dr. J. A. Pearce, of the Dominion Astrophysical Observatory, reviewed the history and modern aspects of the problem of the rotation of our galaxy.

Three sessions were held on Thursday for the presentation of forty brief contributed papers, the concluding hour of the morning session being devoted

to a joint assembly with the American Mathematical Society, at which time Professor H. P. Robertson, of Princeton University, delivered by invitation an address on "Geometry and Physical Space-Time." Professor Robertson discussed the rôle of geometry and kinematics in modern physical theory.

Two invited papers were presented on Friday morning. Dr. O. E. Buckley, of the Bell Telephone Laboratories, reviewed a series of researches on the nature of ferromagnetism and its application to telephony, illuminating the contrasts between academic and industrial research in physics. Professor George Gamow, of George Washington University, concluded this session with a discussion of the present status of the theoretical problem of radioactive β decay.

On Friday afternoon members of the physics department of the University of Washington invited inspection of their high-voltage (800 kv.) researches upon x-rays and high-energy particles.

Attendance at the sessions ranged from 70 to 160 persons.

AMERICAN CHEMICAL SOCIETY, PACIFIC INTER-SECTIONAL DIVISION

(Report by V. Sivertz)

Thirty papers were presented during three sessions at the Seattle meeting. Papers dealing with analytical chemistry included one by H. W. Stone, who showed that chromous sulfate is a more efficient reagent for the removal of oxygen from gases than such conventional reagents as alkaline pyrogallate or ammoniacal cuprous chloride. In addition, the reagent is easy and safe to handle. The sodium chloride content of sea air was reported by W. F. Seyer. W. E. Caldwell described a delicate and efficient method of assaying cyanide solutions of silver and gold and outlined a wet concentration method for cinnabar ores, using only carbon dioxide, lime and sodium sulfide. G. R. Robertson described the use of alloy tubes in organic combustion analysis.

R. A. Ogg, Jr., reported on the kinetics of the decomposition of isomeric propyl iodides and on the addition reaction between hydrogen bromide and cyclohexene. W. Ure described the induced decomposition of diethyl ether and the pyrolysis of butyraldehyde. Sodium lauryl sulfate was shown by V. Sivertz to be quite stable in acids at room temperature, but considerably hydrolyzed by acids at 60°. W. L. Beuschlein reported on studies in the lime-sulfur dioxide-water system.

The important paper by J. W. McBain, T. F. Ford and D. A. Wilson was given simultaneously at the Rochester meeting. H. V. Tartar and R. Reitmeier showed the surface tension lowering of water by triethanolamine soaps, and H. V. Tartar and W. H.

Cone contributed to the knowledge of the passivity of iron. Other papers on surface phenomena included studies by M. J. Marshall on the adsorption of oxygen by charcoal and the surface oxidation of charcoal, proving that the main reaction at low pressures gives carbon monoxide as a product. J. L. Culbertson reported density changes of charcoal and silica gel on wetting by different liquids. L. Friedman proposed a modification of the Stokes-Einstein equation for the determination of molecular weight by diffusion.

Experimental work of a general nature included electric moment studies of some hydrazine derivatives by P. R. Frey. H. V. Tartar and H. G. Houlton described a new efficient Raman spectra mercury arc. V. Sivertz suggested the possibility of using tungsten as electrode material in conductivity cells.

W. F. Seyer obtained some separation of *cis*- and *trans*- isomers of decahydronaphthalene by distillation and reported on the solubilities of dicetyl in ethane, propane and butane. Ingo W. D. Hackh described molecular models useful in teaching organic chemistry. J. M. Luck reported on the effect of hydrogen-ion concentration on extraction of liver proteins and their subsequent fractionation.

ASTRONOMICAL SOCIETY OF THE PACIFIC

(Report by T. S. Jacobsen)

The astronomy section was well attended by representatives of the leading institutions on the coast from California to Canada.

At the opening session, Dr. W. E. Harper, of the Dominion Astrophysical Observatory, Victoria, B. C., gave a survey of the present activities in the field of stellar spectroscopy. He touched first on the astronomer's improved working equipment, such as larger telescopes, the increased effectiveness of aluminizing the mirrors, new camera lenses, emulsions and developers. At the large observatories, radial velocity programs are now generally restricted to the solution of some special problem, as when use is made of the differences in velocity caused by galactic rotation, to find the main features of this phenomenon itself. Our knowledge about the physical properties of the stars themselves has recently increased through a study of the star Zeta Aurigae, whose light was recently modified by a protracted eclipse, the brighter component star being gradually covered up by the extensive atmosphere of its darker companion.

Two papers on spectroscopic binaries from the Lick Observatory show that fruitful results can still be obtained in this classical field. In the fourth catalogue of spectroscopic binaries by Dr. J. H. Moore, 364 stars of variable radial velocity have been added to those included in the third catalogue, published

twelve years ago. Statistical studies on the new material confirm Struve's criterion of separating binary systems from Cepheid variables of short period. Velocities of Beta Coronae, studied by Dr. F. J. Neubauer, suggest both a binary system and atmospheric activity. Work in other fields was reported by Drs. C. E. Smith and R. J. Trumpler. Both investigators deal with the effect of absorbing matter in obscuring parts of the Milky Way from our sight, and in vitiating the conclusions formerly drawn from star counts concerning the structure of our galaxy. The distance and thickness of the cloud in Aquila is estimated, and an attempt is made to find a model of our stellar system which is free from the distorting effects of absorption.

A group of papers from the Mount Wilson Observatory dealt with various aspects of the sun. The question: "Are Rowland's Solar Spectrograms still supreme?", must be answered in the negative according to Dr. H. D. Babcock, whose spectrograms are equal or superior to Rowland's. The influence of solar eruptions on radio transmission was clearly brought out by R. S. Richardson. His data make it appear that the disturbing influence travels with the velocity of light.

Dr. Kaplan, of the University of California at Los Angeles, presented his latest oxygen-nitrogen afterglow studies, which indicate that the light of the night sky is produced by phosphorescence rather than by a weak discharge.

Much interest was shown in a paper on observations of the planets by Dr. E. C. Slipher, Lowell Observatory, accompanied by magnificent slides, some of which were photographed on natural color plates. Dr. Slipher's studies reveal that the atmosphere of Mars is by far the most earthlike of all the planets and must contain water vapor. Observations by Dr. Lampland show that a star in a southern spiral nebula should probably be classed as a super-nova star, ten million times brighter than the sun.

A semi-popular paper on the construction of a twenty-two inch reflector, probably the largest home-made telescope in existence, was given by Mr. G. F. Tauchmann, of Berkeley, California. This shows that, with limited equipment, amateurs may build larger instruments than are usually considered.

The last session held at the Dominion Astrophysical Observatory consisted of five papers by members of the staff. The first two, by Director Harper and by Dr. J. A. Pearce, touched upon investigations of spectroscopic binaries, which has formed such a large part of the work of the observatory since 1905. More than 120 systems have had their orbits fully determined. Some are now being reobserved for the purpose of finding such changes as throw light upon the

constitution of the stars themselves. Dr. C. S. Beals finds that interstellar clouds may have velocities large enough to obscure the effect of galactic rotation. Information about the individual luminosities of the components of spectroscopic binaries has hitherto been limited to those stars in which the light of one component is periodically shut off by the other. Dr. R. M. Petrie has developed a method in which this information is obtained from the profiles of the spectral lines of stars showing two spectra. From intensity measurements on the carbon bands in an R-type star, Dr. A. McKellar finds the relative abundance of the carbon isotopes 12 and 13 to be smaller than in terrestrial sources.

Dr. Petrie also showed spectrograms on the screen of Nova Lacertae obtained by him the night before, when it was first discovered.

In the evening a number of guests of the observatory joined the members of the society in the observatory dome at an illustrated lecture by Dr. F. G. Pease, Mount Wilson Observatory, on the construction and grinding of the two hundred inch mirror.

ASSOCIATION OF PACIFIC GEOGRAPHERS

(Report by H. F. Raup)

The meetings of the Association of Pacific Coast Geographers were held at Seattle on June 18 and 19. Twenty-two papers were presented, of which thirteen constituted a symposium on geographical conditions of the Northwest. Climate of the region was described by Phil E. Church; geomorphology and soils by Howard Coombs, Otis W. Freeman and J. Wright Baylor; activities of the lumber industry by Willis B. Merriam and J. Allen Tower; industries and agriculture by Enid Miller and Frances M. Earle; the Cascade highlanders by Claude Cox, and population growth by Carl Mapes and Leonard Ekman. The city of Seattle was the subject of two papers by Howard H. Martin and Albert L. Seeman.

Miscellaneous papers presented on June 19 included a presentation of new temperature-anomaly maps by Winnifred Varney; a paper on "The Decline of the Hosiery Industry at Laconia, N. H.," by J. Norman Carls; "The Effects of a State Boundary Line on the Human Geography of the Narragansett Bay Area," by Edward Ullman; "The History of the Gadsden Purchase," by Joseph Hazard; "Phases of the Tacna-Arica Controversy," by G. M. McBride; "Unstable Conditions of Land Use within the Motion Picture Industry," by H. F. Raup; "The Decline of the Indigo Industry," by W. W. Ristow; "The Geography of the Polish Corridor," by Maxim Von Brevern; and a paper on "The Use of Geography in Teaching Social Sciences," by Elmer Fullenwider.

At a luncheon meeting on June 18, Dr. Howard H.

Martin, of the University of Washington, addressed the members and friends of the organization on "The Expanding Field of Geography." The annual banquet on June 19 was followed by the presidential address, given by Dr. Otis Freeman, on "The Grand Coulee." The afternoon of June 18 was used for a survey of Seattle under the direction of Albert L. Seeman, W. B. Merriam and C. H. Mapee. The group was particularly interested in an inspection of the quick-freezing plant, where many varieties of fish are preserved and stored.

Officers for 1936-1937 were elected as follows: *President*, Howard H. Martin, University of Washington; *Vice-president*, Walter Redford, Southern Oregon State Normal School, Ashland, Oregon; *Secretary-treasurer*, H. F. Raup, University of California at Los Angeles.

GEOLOGICAL SOCIETY OF AMERICA, CORDILLERAN SECTION

(Report by A. C. Waters)

The Cordilleran Section of the Geological Society of America met in Johnson Hall, University of Washington, on June 18, 1936. Fifty-two members and guests attended. Sixteen papers were presented.

Among the more significant papers was the one on the geology of Mt. Rainier National Park by Howard Coombs. Mt. Rainier is not a simple volcano but has had a long and complicated history of violent explosions, effusion of lava and long periods of dormancy succeeded by renewal of activity. The present cone, which is now being trenched by living glaciers, was built on the remnants of a former cone which had been greatly worn down by the glaciers of a former epoch. This earlier volcano rests in turn on an irregular basement composed of older volcanic and intrusive rocks.

Scientists of the Scripps Institution of Oceanography reported the results of a chemical study of the organic nitrogen content of muds and other sediments dredged from off the coasts of California and Central America. The nitrogen content, as well as the total content of organic matter, is greatest in samples from the basins or deeper pools on the sea floor and decreases greatly in the less stagnant parts of the sea where open circulation is maintained. These results are believed to throw light on the conditions involved in the origin and accumulation of petroleum, particularly with regard to the California oil fields, where the petroliferous sediments show evidence of having been deposited in similar basins on the sea floor.

Hewitt Wilson directed attention to new experiments showing the high quality of the mineral olivine as a refractory, and pointed out that vast stores of this substance are available in Washington.

OCEANOGRAPHIC SOCIETY OF THE PACIFIC

(Report by Rex J. Robinson)

The program opened with a luncheon at which C. McLean Fraser, of the University of British Columbia, was elected president; Erik Moberg, of the Scripps Institution of Oceanography, vice-president; and U. S. Grant IV, of the University of California at Los Angeles, member at large. The contributed papers at the two half-day sessions were well received by the hundred people in attendance. F. A. Davidson correlated the distribution of Pacific salmon with water temperature. Later J. E. Guberlet gave his personal observations on the distribution of animals in Puget Sound. The dinoflagellate genus *Ceratocorys* was discussed by H. W. Graham, as were the varieties of *Eucalanus elongatus* in the Pacific plankton by Martin W. Johnson. Studies of the metabolism of a marine flagellate were reported by Dora P. and B. S. Henry. The effect of volume on the exceptional growth of bacteria on glass surfaces in water was described by C. E. ZoBell and D. Q. Anderson. Reports by C. L. Utterback on the radioactivity of ocean bottom sediments, with L. A. Sanderman, the seasonal variation of submarine solar radiation, with E. Miller, and the scattering of submarine solar radiation, with W. Jorgensen, were of general interest. The arsenic content of certain marine organisms was

reported by E. A. Penick and E. R. Norris. R. J. Robinson and H. J. Spoor discussed the photometric silicate determination for marine waters. Variation of the B/Cl ratio for the Pacific in contrast to the constancy reported elsewhere was noted both by K. Gehring and E. G. Moberg, and by I. Igelsrud and T. G. Thompson. Seasonal variations in the waters of the San Juan Channel were reported by Lyman Phifer and T. G. Thompson. J. P. Tully suggested the use of hydrodynamic observations as a method for increasing the accuracy of surface current charts. The determination of atmospheric nitrogen in sea water was described by E. G. Moberg, R. H. Fleming and H. Nakamura. A comparison of the oxygen content of the Pacific and Atlantic Oceans was made by E. G. Moberg, R. H. Fleming and R. Revelle, who also reported oceanographic investigations between the Aleutian and Hawaiian Islands, as well as off the southern California coast. R. H. Fleming gave additional data for the Gulf of California, and the waters off the Central American coast. The waters of the Bering Sea and the North Pacific were discussed by C. A. Barnes and T. G. Thompson, while T. G. Thompson, W. C. Sands and A. J. Sorenson reported studies off the Washington, Oregon and northern California coasts.

(To be concluded)

SCIENTIFIC EVENTS

RESEARCH IN TROPICAL MEDICINE

THE British Medical Research Council, advised by the Tropical Medical Research Committee, which it recently appointed after consultation with the Colonial Office, has made the following announcement:

Three junior fellowships are offered immediately, for award to qualified medical men wishing to receive training with a view to careers in research work in tropical medicine. Preference will be given to candidates who have already had preliminary experience of methods of research in some branch of medical science. Subject to satisfactory reports, the fellowships will be tenable for three years. The first year will be spent at a school of tropical medicine; the second in doing research in the same or some other institution at home; and the third largely in work under direction at some center in the tropics. The stipend will be at the rates of £300, £400, and £500 per annum in the successive years, with an additional allowance during service abroad and necessary expenses.

The council has every reason to believe that men who undergo this training will be eligible and well qualified for various appointments, apart from the prospects of further employment under the scheme now announced.

In three years' time at least one senior fellowship will be available for candidates who have held the junior fel-

lowships mentioned above. This will be awarded for a further period of three years, carrying stipend at the rate of £600 to £750 per annum, with an additional allowance during service abroad and expenses. The time will be spent mainly in research work in the tropics.

The council is also prepared to consider immediate applications for senior fellowships from candidates who have had adequate experience in research work, whether already specially trained in tropical medicine or not.

The council further intends to establish in due course, as suitable investigators become available as the result of the fellowships scheme, permanent and pensionable appointments for research work in tropical medicine, including senior posts. Members of this research staff will work partly in the tropics and partly in institutions at home, to which they will be severally attached. The exact terms of service are still undecided, but they will not be less favorable than those which apply to other Government appointments at home or over-seas for men of similar professional standing.

Inquiries may be addressed to the Secretary, Tropical Medical Research Committee, 38, Old Queen Street, London, S.W.1, with whom applications should be lodged not later than October 1.

THE SECOND INTERNATIONAL FORESTRY CONGRESS

As has already been announced in *SCIENCE*, the second International Forestry Congress will convene in Budapest, Hungary, from September 10 to 17. Following the regular sessions there will be several three-day trips to forest and scenic regions of the country. The last International Forestry Congress was held in Rome in 1926, when some fifteen American foresters attended.

The Budapest meeting is organized under the patronage of Premier Nicholas Horthy, with Baron Clement Waldbott as president, and four deputy vice-presidents from four different countries; Dr. F. A. Silcox, chief forester, U. S. Forest Service, is one of these.

The American forestry delegation will consist of eleven foresters and five lumbermen, with Dr. Silcox as chairman of the delegation and Jno. D. Guthrie as vice-chairman. Mr. Guthrie will read a paper before the congress on "The American Civilian Conservation Corps," while several of the American delegates have submitted papers for the *Proceedings* to be published following the congress.

The congress is organized into nine sections, as follows: I. Forest Statistics, Forest Policy, Legislation; II. Forest Management and Research; III. Timber Trade and Forest Products; IV. Utilization and Forest Industries; V. Mechanical and Chemical Technology of Wood; VI. Silviculture and Plant Production; VII. Regulation of Streams, Protection of Soils and Forests; VIII. Rural Economy and Forests, Recreation; IX. Tropical Forestry.

The official languages will be French and Hungarian, though delegates may speak or present papers in their own language.

The following are the American delegates, of whom ten will tour the forests of the German-speaking countries of Europe after the congress under the Oberlaender Trust of the Carl Schurz Memorial Foundation:

- Dr. F. A. Silcox, chief forester, U. S. Forest Service, Washington, D. C.
- C. E. Rachford, assistant chief, U. S. Forest Service, Washington, D. C.
- Dr. Raphael Zon, director, Lake States Forest Experiment Station, St. Paul, Minn.
- Jno. D. Guthrie, Civilian Conservation Corps, U. S. Forest Service, Washington, D. C.
- T. R. C. Wilson, U. S. Forest Products Laboratory, Madison, Wis.
- Ovid M. Butler, secretary-manager, American Forestry Association, Washington, D. C.
- Tom Gill, Pack Forestry Foundation, Washington, D. C.
- Professor Shirley W. Allen, Department of Forestry and Conservation, University of Michigan.

John B. Woods, forester, National Lumber Manufacturers Association, Washington, D. C.

Dr. Henry I. Baldwin, director, Fox Research Forest, Hillsboro, N. H.

Richard R. Fenska, forester, Bartlett Tree Experts, Inc., White Plains, N. Y.

E. L. Kurth, president, Southern Pine Association, Keltys, Texas.

A. T. G. Moore, manager, Conservation Department, Southern Pine Association, New Orleans, La.

Julian F. McGowin, secretary, W. T. Smith Lumber Company, Chapman, Ala.

George F. Jewett, manager, Potlatch Forests, Inc., Coeur d'Alene, Idaho.

Frank Kennett, Kennett Lumber Company, Conway, N. H.

STANDARD TESTS FOR SOILS USED IN ENGINEERING

A NEW committee with the tentative title "Soils for Engineering Purposes" is to be organized by the American Society for Testing Materials. Work on the development of this new committee is already under way.

In 1935, through the work of the Subcommittee on Soil Testing, Committee D-4 on road and paving materials, the society issued nine methods of testing soils. These tentative standards, although limited to the use of soils for highway construction, can for the most part be considered for broader application. The new committee is expected to take over the work of this subcommittee and expand it.

It is believed by the society that it can render a definite service in undertaking study of soils and standardization of methods of determining their various properties. A survey made in 1932 indicated that more than half the states relied in varying degree on subgrade properties as factors in highway design and some thirteen of these had laboratories equipped to perform various routine tests, including those suggested by the U. S. Bureau of Public Roads. A great deal of work has been done recently by various branches of the government in connection with foundation surveys for huge dams that are being built.

C. A. Hogentogler, senior highway engineer of the U. S. Bureau of Public Roads, who is chairman of the D-4 Subcommittee on Soil Testing, has been appointed to serve as temporary chairman of the new committee, and H. F. Clemmer, engineer of materials, District of Columbia, will act as secretary, pending formal organization of the committee. Mr. Hogentogler's paper (with A. E. Willis) on "Subgrade Soil Testing Methods," which was presented at the 1934 annual meeting, won the award of the Charles B. Dudley Medal for that year "in recognition of its outstanding merit as an original contribution on research in engineering materials."

RESEARCH APPOINTMENTS AT YALE UNIVERSITY

STERLING research fellowships, granted to students who hold the Ph.D. degree or its equivalent, have been awarded for 1936-37 to John R. Reid, of the University of California, for the continuation of his research on the method and basis of the value-theory, and to Robert W. Wilson, for work on the anatomy of now extinct rodents, with special reference to the Bridges Collection in the Peabody Museum of Natural History at Yale University.

Lester W. Burket, of Woodmont, Conn., will complete his work on the correlation of histological findings and gross bacteriological and roentgenological examination on a collection of over five hundred human teeth. Dr. Mott Souders, Jr., of Red Lodge, Mont., will continue his study of the vapor-liquid equilibria of hydrocarbons. Professor Allan Hemingway, of the University of Minnesota, will spend a year's leave of absence at Yale studying the physiological responses to measured doses of heat. Noble S. R. Maloeuf, of Didsbury, Manchester, England, will work on a zoological problem involving the measurement of energy requirement.

The theory of Tauberian Theorems will be investigated by Israel Halperin, of Toronto, Canada. Dr. Philip S. Winnek, of San Diego, Calif., who received the Ph.D. degree from the University of California in 1935, will continue his study of the physiological rôle of bromine in the mammalian animal.

Dr. Theodore G. Mehlin, of Des Moines, Iowa, who in his dissertation last year presented a new method for measuring photographic plates, will continue his work in this field. Dr. Kenneth R. More, of Watertown, Mass., will investigate the absorption band spectra of refractory salts and of diatomic molecules which are formed at high temperatures.

Several of the leading foundations, among them the National Research Council and the Rockefeller Foundation, will send students to study at Yale University next year.

Dr. Robert S. Dow, of the State of Wisconsin General Hospital staff, on a grant from the National Research Council, will study comparative problems relating to the cerebellum of primates. Dr. Llewellyn T. Evans, of Harvard University, on a grant from the same foundation, will study, with Dr. Edgar Allen, professor of anatomy in the Yale School of Medicine, the endocrines which influence reproduction.

The Rockefeller Foundation will also send two fellows: Dr. Robert Messimy, of the University of Paris, who will work jointly with Dr. Harvey Cushing and

Dr. John F. Fulton, and Dr. William R. Willard, assistant resident physician in pediatrics at the Strong Memorial Hospital, Rochester, N. Y., who will complete the requirements for the degree of doctor of public health, under the direction of Dr. Ira V. Hiscock.

Dr. Leon Ectors, of Brussels, has received an award from the Commission for Relief in Belgium Educational Foundation for further research on the autonomic functions of the cerebral cortex.

Dr. Averill A. Liebow, of New Haven, has been appointed Charles Linnaeus Ives fellow in pathology. His research will be concerned with some phase of tissue cultures.

The Josiah Macy, Jr., Foundation has granted a fellowship to Dr. Paul D. Rosahn, whose research will be devoted to disorders of the heart and blood vessels. Dr. Rosahn was formerly assistant director of the Research Laboratory of the Public Health Institute, Chicago.

Robert S. Turner, of Independence, Kans., a candidate for the Ph.D. degree in June, has been appointed fellow on the Knight Fund to continue his study of the electrical changes in the nervous system associated with functional disorders. The research will be carried on under the direction of Dr. Harold S. Burr.

Two Bernice P. Bishop Museum fellowships have been awarded for study and research in the Hawaiian Islands. Frank E. Egler, of New York City, a candidate for the Ph.D. at Yale in June, will begin research there toward an eventual phytosociological survey of the islands, while Dr. Alfred Metraux, of Paris, France, will complete his study of the folklore and ethnological material which he brought back from an expedition to Easter Island, led by him in 1934-35.

The Theresa Seessel fellowships have been granted to Arthur Cohen, of Montreal, and to Dr. Francis Drouet, of Columbia, Mo. Mr. Cohen, who received the Ph.D. degree in zoology at McGill University in June, will continue his investigation of the general relationships existing between cell division and cell specialization, and Dr. Drouet will devote his research to algae collected on a recent trip to Brazil.

Dr. Ural S. Ashworth, of Columbia, Mo., has been reappointed to an Alexander Brown Coxe fellowship to enable him to continue his present study of the factors influencing the minimum requirements of the body for energy and protein. Daniel Melnick, of New Haven, a candidate for the Ph.D. degree, has also received an award on this foundation. He will continue his research dealing with the mechanism of cobalt polycythemia.

SCIENTIFIC NOTES AND NEWS

THE University of Kentucky plans to honor Professor Thomas Hunt Morgan, director of the William G. Kerekhoff Laboratories of the Biological Sciences at the California Institute of Technology, on the occasion of his seventieth birthday on September 25. Dr. Fernandus Payne, dean of the Graduate School of Indiana University, will speak on "Morgan, The Man and his Contribution to Science" at a general convocation, and on a scientific subject dealing with Dr. Morgan's work at an open meeting sponsored by the Kentucky Chapter of Sigma Xi. The University of Kentucky, from which Dr. Morgan graduated in 1886, will present a bronze plaque that will be placed upon "Hopemont," situated in the heart of Lexington, his birthplace.

DR. E. H. SELLARDS, professor of geology in the Graduate School of the University of Texas, has been appointed research professor for 1936-37. Each year the Board of Regents selects a member of the faculty for this honor and relieves him of part of his teaching duties in order that he may give more time to research. At the end of the year, he presents lectures of both general and technical interest, embodying the results of the year's work.

THE King gold medal of the Peking Society of Natural History has been awarded to Professor Bernard E. Read, head of the physiological division of the Henry Lester Institute of Medical Research, Shanghai, China, "for his noteworthy contribution to further knowledge in the field of the natural sciences, especially in this instance for his meritorious work on Chinese drugs." The presentation was made at the annual dinner of the society held on April 18 at Pekin Hotel. Professor Read gave an address at the meeting on "The Bones, Blood and Brains of Chinese Medicine."

At a recent meeting of the senate of the University of Bristol, a vote of thanks was passed to Emeritus Professor Walker Hall, for the valuable work he has done in the last three years in acting as director of the Preventive Medicine Laboratory and in establishing its work. Tributes were also paid to Professor Francis Francis, who has been a member of the staff of University College and of the university for forty-one years and has held the Alfred Capper Pass chair of chemistry since 1909, and Professor William Morgan, who has been professor of automobile engineering since 1909, both of whom are retiring.

THE Graham Legacy Committee, under the regulations for the administration of the Charles Graham Medical Research Fund of the University of London, recently awarded a gold medal to Sir Thomas Lewis,

physician in charge of the department of clinical research at University College Hospital, for research work in connection with the treatment of cardiac disease conducted at the hospital and its medical school.

PROFESSOR LUDWIG ASCHOFF, of Freiburg in Breisgau, has been awarded the silver Carl Ludwig Medal of Honor by the German Society for Investigation of the Circulation.

THE Imperial Academy of Medicine of Japan has presented its highest distinction (the Emperor's prize) to Drs. Sasaki and Yoshida for their researches in the experimental production of cancer of the liver by ingestion of ortho-amido-azotoluol.

BRITISH CIVIL LIST pensions, as reported in *Nature*, include the following pensions for services to science: Miss A. M. Buckton, in recognition of her services to literature and of the services rendered by her father, the late George B. Buckton, to entomology, £60; Mrs. S. I. Cunningham, in recognition of the services rendered by her husband, the late J. T. Cunningham, to zoology, £90; Miss R. M. Fleming, in recognition of her services to anthropology and geography, £80; Mrs. C. D. Hodgkinson, in recognition of the services rendered by her husband, the late Professor W. R. Hodgkinson, to chemistry, £90; Mrs. B. Kaye, in recognition of the services rendered by her husband, the late W. J. Kaye, to the study of archeology, £60.

DR. HOWARD A. MCCORDOCK, associate professor of pathology at Washington University, St. Louis, has been appointed head of the department of pathology to succeed Dr. Leo Loeb, who will retire this year, having been connected with the university since 1915.

DR. NOLAN DON CARPENTIER LEWIS has been appointed director of the New York State Psychiatric Institute and Hospital, one of the units of Columbia-Presbyterian Medical Center. Dr. Lewis has been assistant professor of neurology in Columbia University and associate director of the Neurological Institute.

It is announced at the University of North Carolina that Acting Dean William J. Miller, professor of electrical engineering, has resigned to join the faculty of the University of Alabama; Dr. A. M. White, associate professor of chemical engineering, has accepted a position at the University of Virginia, and C. W. Borgmann, assistant professor of chemical engineering, has accepted an industrial position.

DR. RICHARD GOLDSCHMIDT, until recently of the Kaiser Wilhelm Research Institute at Berlin-Dahlem, has arrived in the United States in order to take up his work as professor of zoology at the University of

California. Before going to Berkeley he visited Los Angeles, where he stayed for several days as the guest of members of the department of zoology.

PROFESSOR C. G. DARWIN, formerly Tait professor of natural philosophy at the University of Edinburgh, who was this spring appointed master of Christ's College, Cambridge, will be succeeded at Edinburgh by Dr. Max Born, who until three years ago was professor of theoretical physics in Göttingen and who has been associated recently with Gonville and Caius College, Cambridge.

DR. ARCHIBALD DURWARD, of the Institute of Anatomy, University College, London, has been elected to the chair of anatomy in the University of Leeds in succession to Professor J. Kay Jamieson, who recently resigned to accept the chair of human anatomy and embryology at the University of Dublin.

DR. ELMER HUTCHISSON, assistant professor of physics of the University of Pittsburgh, has received leave of absence for one year to join the staff of the American Institute of Physics, New York City. He will assist the director of the institute in connection with a number of projects, most of which are aimed to promote applications of physics. The institute and the founder societies hope, with Dr. Hutchisson's help, to improve and extend the value of meetings and publications in the eyes of industrial physicists so that the latter will participate more generally than heretofore in these activities.

DR. EARL E. SHERFF, of the Chicago Normal College, has been appointed honorary research associate in economic botany on the staff of the Field Museum of Natural History, "in recognition and appreciation of valuable services and cooperation that he has given to the institution for many years."

DR. LELAND S. MCCLUNG, of the research laboratories of the American Can Company, Chicago, has joined the staff of the division of fruit products of the College of Agriculture of the University of California. He plans to make a study of microbes in fruit and vegetable products.

DR. WILLIAM DOCK, associate professor of medicine, Stanford University School of Medicine, has been appointed secretary of the San Francisco Heart Committee to succeed Dr. Amos Christie, who has resigned to engage in work at the Johns Hopkins University Hospital for the U. S. Children's Bureau.

A SEPARATE departmental unit, to be known as the Wyeth Division of Tests and Standards, has been established by John Wyeth and Brother, Philadelphia. It will be under the direction of Dr. James C. Munch, professor of physiology and pharmacology and di-

rector of research at the College of Pharmacy of Temple University.

DR. ALEX. R. TODD, Beit Memorial research fellow in the department of medical chemistry of the University of Edinburgh, has been appointed a member of the staff of the department of biochemistry of the Lister Institute.

SIR WILLIAM WRIGHT SMITH, Regius professor of botany in the University of Edinburgh, King's botanist in Scotland and Regius keeper of the Royal Botanic Garden, Edinburgh, has been elected a member of the British Agricultural Research Council in succession to Sir John B. Farmer, who has resigned for reasons of health.

PROFESSOR J. T. STARK, of the department of geology of Northwestern University, is on leave during the summer and the academic year 1936-37. He is spending a part of the year in petrographic investigations in the Southern Pacific region and a part of it in France. He will attend the International Geological Congress in the U.S.S.R. before returning to this country.

RESEARCH during the summer is being carried on at the Medical School of the University of California in San Francisco by Dr. S. A. Peoples, fellow in the Maudsley Hospital of London, who was recently appointed assistant professor of pharmacy at the University of Louisville, and by Dr. P. K. Knoefel, formerly national research fellow at the medical school, who are making a study of depressants on the central nervous system. Dr. George Emerson, head of the department of pharmacy of West Virginia University, is engaging in laboratory work on the problems of anesthetic shock.

DR. LECOMTE DU NOÛY, head of the department of biophysics of the Pasteur Institute, Paris, has received a mission from the French Government to study conditions of scientific research and laboratories throughout the world. He will visit successively Italy, India, Japan, the United States, Brazil, Argentina, England and Germany.

DR. GUSTAVUS J. ESSELEN, of Boston, sailed on August 12 to represent the National Research Council and the National Academy of Sciences as an official delegate to the twelfth conference of the International Union of Chemistry, which meets in Lucerne, Switzerland, from August 16 to 22.

ACCORDING to press reports, three members of a United States Geological Survey party were trapped and burned fatally on July 27 in a forest fire raging on a 25-mile front in the Little Rockies mountain range southeast of Havre, Mont. They are: Cameron

Baker, graduate student at Northwestern University; John Rowles, of Landusky, Mont., and S. R. Brockmeier, a graduate of Yale University. Dr. Maxwell M. Knechtel, assistant geologist of the survey and leader of the field party, was rescued suffering from burns, shock and exhaustion.

THE sixteenth annual meeting of the Highway Research Board of the National Research Council will be held in Washington, D. C., from November 18 to 20.

THE Society for Research on Meteorites was incorporated on July 27 as a non-profit corporation, under the laws of the State of California. This society, which is international in membership, was organized in August, 1933, and became accredited in April, 1935, to the American Association for the Advancement of Science as an associated society.

THE eighth annual summer meeting of the Botanical Society of America was held from July 27 to July 30 at the University of Wyoming Summer Camp in the Medicine Bow Mountains. Field trips to rock fells, alpine meadows, bogs and forests were conducted by Professors G. D. Fuller, Aven Nelson and P. B. Sears. During the session addresses were given by Professor O. A. Beath, research chemist at the University of Wyoming, on "Seleniferous Plants"; by Dr. E. F. Costello, of the United States Forest Service, on "Range Survey—Aims and Methods"; by Professor G. D. Fuller, of the University of Chicago, on "Post-Glacial Vegetation of Northern Illinois"; by Dr. E. L. Joy, of the United States Forest Service, on "The Spread of the White Pine Blister Rust"; by Dr. E. H. Moss, of the University of Edmonton, on "Rings of Periderm in Wood"; by Dr. H. T. Northen, of the University of Wyoming, on "Protoplasmic Viscosity in Dividing Vegetative and Reproductive Cells"; by Professor P. B. Sears, of the University of Oklahoma, on "The Place of the Scientist in the Modern World," and by Dr. J. Voss, of the Illinois Natural History Survey, on "Interglacial Vegetation of Northern Illinois."

THE sixth World Poultry Congress was held at Leipzig from July 24 to August 2, under the auspices of the World Poultry Science Association. The first congress was held in Holland in 1921, the second at Barcelona in 1924 and others in Canada in 1927, London in 1930 and Rome in 1933. It is expected that the congress will be held in the United States in 1939. The official opening of the congress on the morning of July 24 was the occasion for an address by the National Minister for Food and Agriculture, who also opened the exhibition in the afternoon. The meetings were interspersed with excursions to poultry establishments and various places of interest, including a day trip to Berlin. At the close of the congress many of the delegates took part in a tour through Germany,

visiting Nuremberg, Munich, Garmisch, Stuttgart, Heidelberg, Frankfurt, Rüdesheim, Coblenz, Cologne and Düsseldorf. During this tour opportunity was afforded for inspecting some of the largest poultry farms and the more important developments in the German poultry industry.

Current Science reports that in response to a general desire among the leading anthropologists of India, a Central Anthropological Association has been formed, with its headquarters in Calcutta, under the name of the Indian Anthropological Institute. Dr. J. H. Hutton is the president and Dewan Bahadur L. K. Ananthakrishna Aiyar and Rai Bahadur Sarat Chandra Roy are the vice-presidents of the institute. K. P. Chattopadhyaya is the treasurer and Dr. B. S. Guha and Dr. Panchanan Mitra are the secretary and the joint secretary, respectively. The institute proposes to hold periodical meetings and promote anthropological research in India on scientific lines and to publish a half-yearly journal.

ON July 18 members of the Chicago Chemists Club entertained members of the Chicago section and other guests, more than two hundred in all, at their annual picnic held on the campus at Patten Gymnasium of Northwestern University. There were informal sports in the afternoon and after the picnic supper several reels of Kodachrome movies were exhibited, which covered many of the scenes visited by the official train to the San Francisco meeting of the American Chemical Society. The officers of the club for the year 1936-37 are as follows: *President*, Dr. C. D. Lowry, Jr., Universal Oil Products Company; *First Vice-president*, Dr. D. L. Tabern, Abbott Laboratories; *Second Vice-president*, John J. Schommer, professor of chemistry, Armour Institute of Technology; *Treasurer*, Edward A. Dieterle, consulting engineer, Chicago; *Secretary*, Dr. Robert B. Reynolds, department of chemistry, Northwestern University.

THE Oregon State College Library is the recipient of a collection of books, the value of which is estimated to be in excess of \$2,500, from the private library of the late Hiram Dryer McCaskey, of Central Point. The collection includes over a thousand bound volumes, as well as several hundred unbound volumes, including professional geological mining books, U. S. Geological Survey publications, some unusual items on the Philippine Islands, works on gardening (rose gardening in particular), fish and game books. Mr. McCaskey was particularly well known as an authority on the gold, silver and quicksilver resources of the United States, and as an authority on the mineral resources and geology of the Philippine Islands. For many years he served with the United States Geological Survey.

DISCUSSION

DROUGHT AND THE FUNGOUS FLORA OF COLORADO

DURING the years from 1930 to 1934, severe drought prevailed throughout the whole country, and the mountainous region of Colorado presented no exception. During these dry years, the fungous flora of this region was sparse. Fungi could be found only along the banks of streams and in a few other scattered moist locations. Many fruiting bodies of the woody perennial fungi had died by the end of the second year of drought. A few xerophytic species, however, persisted throughout the dry years. Mushrooms, boletes, coral fungi, cup fungi and others were conspicuously absent in locations where in moist years they abounded.

These five consecutive dry years were followed in 1935 by a dry winter, but from April to September of that year an abundance of moisture fell and the average rainfall throughout these months was in excess of normal. In view of the dry winter, however, the yearly average in some cases showed a slight deficiency of moisture.¹ With the return of an adequately moist growing season in 1935 one might expect a return of the abundant fungous flora which so marks the mountainous region of Colorado during moist years. This, however, was not the case. The fungous flora was more abundant than in any of the preceding dry years, but markedly less abundant than in any year preceding the drought that received a normal amount of moisture.

A few of the observations made during the summer of 1935 might be mentioned. Near Kingston Peak, elevation 11,000 feet, it was noted by the author and his wife that certain kinds of boletes and agarics could be found growing on the ground only around the edge of thick conical clumps of Engelmann spruce. These species of boletes and agarics are not known to be parasitic on the roots of evergreens; nor were they known to produce fruiting bodies in this location during the drought period. The conical clumps of Engelmann spruce conduct run-off water as would a tepee, with the result that the soil around the edge of these clumps is always more moist than elsewhere. It is thought that during the years of drought the scanty rainfall, when concentrated in this manner, was sufficient to at least keep the perennial mycelia alive. On the advent of more favorable conditions of moisture in 1935, fruiting bodies were developed. During years of normal moisture, these particular fungi are found in locations other than that explained above. Furthermore, it was noted that agarics and boletes were found growing more abundantly on the ground under brush piles and fallen trees than in open locations. It is

likely that this forest debris may have been instrumental in keeping the perennial mycelia alive throughout the drought by conserving the moisture. Also, during the years of average precipitation, the fruiting bodies of wood-destroying fungi make their appearance at certain times of the season; thus they are classified as spring, summer and autumn fruiting. During the season of 1935, many of these fruiting bodies appeared from one to three months late. It is thought that either the perennial mycelia in the logs were so depauperated from the prolonged dry period that a longer time than usual was required for formation of fruits, or the mycelia were killed and the fruiting bodies developed from new infections initiated from spores that were carried from the few widely scattered fruiting bodies that endured the dry period due to their favorable location with relation to moisture.

In conclusion, during the dry years many or most of the fungi died and only those situated in favorably moist situations lived. It is thought that the return of the abundant fungous flora of the mountainous region of Colorado will depend upon the occurrence of several or perhaps many seasons of abundant precipitation in succession, and that during these moist seasons "reseeding" from the widely scattered areas where a few plants flourished during the five dry summers will take place.

P. F. SHOPE

UNIVERSITY OF COLORADO

THE FRESH-WATER MEDUSA IN LOUISIANA

AN appearance of the gonosomes of *Craspedacusta* has recently been observed at Monroe, La., by Mrs. J. W. Granberry and Mr. P. H. Murdaugh, who have supplied the authors with valuable information of the occurrence and with a quantity of preserved material. The medusae were found in an old open city reservoir on Wood Street, a concrete tank about fourteen feet deep with an accumulation of sand and clay on the bottom, connected with the city mains and also receiving some contribution of seepage. A previous appearance of the jellyfish in numbers is believed to have taken place in 1932 or 1933. In June, 1935, a quantity of medusae was again observed and a sample of six specimens preserved. Later in June the reservoir was drained, refilled and stocked with sunfish; nevertheless, by August of the same year gonosomes were again present in large numbers, and over four hundred were preserved. Two individuals of the June sample and 103 of the August lot, sent to the Bingham Oceanographic Laboratory for examination, yield the following information:

The June specimens are respectively 8.1 and 6.6 mm

¹ U. S. Department of Agriculture, Weather Bureau, *Climatological Data*, Colorado Section 40 (13): 1935.

in bell diameter; the August ones range from 7 to 13 mm, bell heights being between one half and three fifths the diameter. All specimens are sexually mature males. In one individual of the August sample the gastrovascular cavity contains a bolus of algal filaments, apparently partially digested, in which is entangled detritus and numerous fragments of copepods; in each of two others there is a small partly digested dipterous pupa. Such a diet does not seem to have been previously recorded for the gonosome, according to the monograph by Dejdar¹ (p. 687).

The irregularity of tentacular arrangement suggested by Dejdar (p. 622) is difficult to discover in the present material, in which these organs are arranged in seven quite complete cycles, fully distinguished in size in the smaller specimens, although somewhat obscured beyond the fifth series in larger ones. An incomplete eighth cycle, increasing in extent with increase in size of the individual, is present. The folds in the nettle-ring of the bell-margin are regularly disposed at the bases of the larger tentacles, of the first through fourth classes in the smaller, the first through fifth in the larger medusae. There are modally three lithocysts between each of these puckerings of the rim; and in conformity with the addition of such folds at base of tentacles of the fifth class in large individuals, there are approximately twice as many lithocysts per quadrant (48) in these as in the smaller ones. Dejdar's conclusion as to the universal pedunculation of the lithocyst concretions in *Craspedacusta* is evidently correct, but with reference to his synonymization of most of the named forms, it is worth noting that the present seems to agree with other American material in displaying a much less conspicuously elongate attachment than that described in medusae from other regions of the world.

If the reported reappearance of the medusoid population subsequent to its removal by drainage of the reservoir at Monroe is correctly interpreted, and if the medusae were not carried into the pool with the water-supply, it may be inferred that the gonosomes, replenished by a hydroid stock which survived the drainage, reached sexual maturity and a diameter of 13 mm within two months after liberation, a growth rate comparable with that found by Dejdar (p. 687-688) in aquarium-reared medusae. Also, if the maleness of the two available individuals of the June sample be assumed to have characterized the entire population at that time, it may be inferred that homogeneity in sexual nature of the gonosomes was maintained in successive liberations from the trophosomes, in the face of some modification of the environment. Dejdar (p. 688) very properly suggests that the quite usual sexual uniformity of local populations of *Craspeda-*

custa requires the assumption of a "getrenntgeschlechtliche Polypengeneration"; nevertheless, the alternative possibility that the prime affect of sexual nature in *Craspedacusta* is environmental seems worth consideration.

PERCY VIOSCA, JR.

NEW ORLEANS, LA.

M. D. BURKENROAD

BINGHAM OCEANOGRAPHIC LABORATORY
YALE UNIVERSITY

A MARINE TENEMENT

SANIBEL ISLAND, in Lee County, Florida, lies three miles off the mainland coast at the mouth of the Caloosahatchee River, and has its long axis generally directed S.E. and N.W. This position affords a southerly exposure to some twelve miles of open beach on the Gulf of Mexico. The immediate locality is exceedingly rich in genera and species of molluscan fauna and also in numbers and unusual variety of other forms of marine invertebrate life.

Drift rows of incalculable numbers of living *Atrina* (*Pinna*), principally *A. rigida* Dillwyn, were stranded on the beaches by the wind-blown tides of early March, 1936. Normally *Atrina* lives in moderate depths of water, buried in the sea-bottom, and attached by a byssus to some point of support with only an inch or less of the free, rounded edge of the bivalve shell exposed to the invasion of inquilines of various other tribes.

These "pen-shells" must have been washed from their beds, quite likely in the hurricane of September, 1935, and must have lain for the succeeding five months in some depression of the sea-bottom between outlying sandbars, not far off shore and at no great depth. This seems evident from the character of the creatures which have adopted these shells for their tenements and made use of the entire extent of their rough outer surfaces.

When the "pen-shell" is buried vertically in sand or mud, as it normally lives, the surfaces of the shell are protected from contact with the larvae of other mollusks, and of worms, crustaceans, ascidians, zooids, etc., which are free-swimming in early life, and also from creeping forms of other invertebrate creatures which seek a firm and stable attachment for themselves or their egg-cases.

These *Atrinas* were covered over from top to bottom with an extraneous medley of living marine animals: principally species which live in shallow water and within the littoral region. Some of them were covered with this adventitious growth on one side only, suggesting that they had lain for some time undisturbed upon the bottom of the sea.

One *Atrina* picked up at random yielded the animals listed in the following inventory:

¹ Zeits. f. Morph. Ökol. Tiere, 28: 595-691, 1934.

Anachis avara similis, 14 mature specimens.
Anachis obesa obesa, several specimens.
Anomia simplex, 3 mature specimens.
Arca occidentalis, 8 mature, 2 young specimens.
Arca transversa, 2 young specimens.
Cantharus tinctoria, 4 specimens.
Chiton sp., 3 specimens.
Clathrodrillia albinodonta, 3 mature specimens.
Clathrodrillia alesidota macilenta, 3 mature specimens.
Crepidula aculeata, 2 specimens.
Crepidula fornicata, 2 specimens with egg-masses.
Erato maugeria, 1 specimen.
Modiolaria lateralis, 2 specimens.
Murex pomum, 1 young specimen.
Murex rufus salleanus, 5 young specimens.
Ostrea virginica floridana, many young specimens.
Urosalpinx perrugatus, 3 mature, 5 young specimens.
 Many barnacles.
 Many worm-tubes, both limy and built of sand.
 One small holothurian.
 Two hydroid colonies with many small crustaceans (*Caprella*) among the branches.
 Several small crabs and a number of other small crustaceans.
 Several colonies of encrusting bryozoans.
 Two small sponges.
 One annelid worm.
 One flat worm.
 Egg-cases of *Cantharus tinctoria*, *Muricidea multangula* and *Anachis avara similis*.

Twenty-five different kinds of animal life, more than a hundred individuals of eight different phyla were living on an area approximating 55 or 60 square inches of the shell surface of one *Atrina*. Only creatures seen by the unaided eye are noted. The microscope would have revealed many more.

LOUISE M. PERRY

SANIBEL, FLORIDA

A GONAD PARASITE OF THE STARFISH

CÉPÈDE in 1910¹ described the astomate holotrichidan, *Orchitophyra stellarum*, from the testis of *Asterias rubens*. He remarked that this protozoan is confined to male starfish, where it causes castration. Piatt in 1935² has found this parasite in the testis of *Asterias forbesi* in Long Island Sound.

During the summers of 1934 and 1935 this protozoan was found in the ovaries of *Asterias vulgaris*, which were taken from the oyster beds in Malpeque Bay, Prince Edward Island. This is apparently the first record of this parasite infesting starfish ovaries. There was no obvious pathological condition of any of the infested ovaries examined, and the eggs therein

contained appeared normal and were fertilizable. However, a histological examination of an infested ovary has not yet been carried out.

The incidence rate of this parasite, taken from a relatively small number of specimens and over a limited area, appears to be about 25 per cent. of the females. Cépède in his paper reported that only three starfish out of 6,000 examined were infested. The incidence rate observed by Piatt was about 9 per cent. of the males.

Cépède observed that although *Orchitophyra* is endoparasitic in the starfish, it is not injured by being placed in sea water. Cultures for starfish larvae, from eggs fertilized in the laboratory, were set up in 1934. The eggs used in one culture happened to be from an infested ovary. After a week's time, when the culture was discarded, *Orchitophyra* was active and apparently normal.

G. F. M. SMITH

UNIVERSITY OF TORONTO

THE FIRST RECORD OF A DINOSAUR FROM THE WEST COAST

ALTHOUGH the Cretaceous deposits of California are extensive and many thousand invertebrate fossils have been collected from these rocks, vertebrates of any kind are exceedingly rare. A few sharks' teeth and fish scales have been collected in this series; but evidence of the reptilian life, so common elsewhere, has been totally lacking until the present time. Some weeks ago, Mr. Allan Bennison, an astute high-school student, found a vertebra in an exposure of the Moreno Cretaceous near Gustin, Calif. Mr. Bennison had been collecting invertebrates in this area for some time, and realized that this find was important. It was forwarded to Dr. G. Dallas Hanna, of the California Academy of Sciences, San Francisco, who, in turn, brought it to the Museum of Paleontology, University of California. It proved to be a pre-sacral vertebra of a *Phythonomorpha*, probably of the *Platycarpus-Tylosaurus* group.

Mr. Bennison continued his work in this region, not content to rest after having turned up the first recognizable reptile from the California Cretaceous. In June, in the same Moreno formation (Upper Cretaceous), near Patterson, Calif., Bennison discovered the first specimen of the dinosauria from the West Coast Cretaceous. The material is very fragmentary and seems to represent only the hind quarters of the animal. There are twenty-seven vertebrae (caudal), parts of the foot and the ends of some of the posterior limb elements. There are over 500 fragments of bone, from which, it is hoped, enough may be "pieced" together to make an accurate determination of the form represented. It is, of course, not possible to definitely

¹ C. Cépède, *Arch. Zool. Exp. et Gen.*, 5^e Serie, 3, 1910.
² J. Piatt, Fisheries Service Bulletin No. 247, U. S. Department of Commerce, 1935.

determine the genus; but from the recognizable fragments found, it appears to be a member of the Hadrosauridae, a "duck-billed" or Trachodont-like form.

CURTIS J. HESSE
S. P. WELLES

MUSEUM OF PALEONTOLOGY
UNIVERSITY OF CALIFORNIA, BERKELEY

NOTICE OF PROPOSED SUSPENSION OF RULES OF NOMENCLATURE IN THE CASE OF BOHADSCH, 1761

THE undersigned invites the attention of the zoologi-

cal profession to the fact that application has been made to the International Commission on Nomenclature to suspend the Rules in Bohadsch 1761, "*De Quibusdam Animalibus Marinis*" and its translation 1776, on the ground that the application of the rules in these cases will produce greater confusion than uniformity.

Zoologists interested in this case, for or against suspension, are invited to present their views to the commission.

C. W. STILES,
Acting Secretary

SCIENTIFIC BOOKS

THE DIARY OF ROBERT HOOKE

The Diary of Robert Hooke, M.A., M.D., F.R.S. 1672-1680. Transcribed from the original in the possession of the Corporation of the City of London (Guildhall Library). Edited by HENRY W. ROBINSON, librarian of the Royal Society, and WALTER ADAMS, B.A. With a Foreword by SIR FREDERICK GOWLAND HOPKINS, O.M., president of the Royal Society. pp. xxviii+527, 8 pls., 3 figs. in text. Taylor and Francis, London, 1935. 21 shillings.

THIS diary was published within a few days of the tercentenary of the birth of its famous writer, who lived in a time fertile in intellectual developments and who himself was a part of the illumination of that brilliant period in the history of scientific accomplishments of the English people.

Robert Hooke (1635-1703) had unusual inventiveness and mechanical skill and was an observer of unusual accuracy and power of interpretation. He also had a penchant for experimentation and utilized his inventive faculties in the perfecting of scientific instruments. He writes quaintly of the construction of such instruments and their subsequent use in observations on nature, as follows: "I design alwayes to make them follow each other in turn, and as 'twere to interweave them, being apart but like the Warp or Woof before contexture, unfit either to clothe or adorn the Body of Philosophy."

His inventions include the spring balance in watches, the anchor escapement, the wheel barometer, the improvements in the air pump, the telescope and the microscope. He formulated Hooke's Law in mechanics, namely, that strain is proportional to the stress producing it within elastic limits. He introduced freezing-point as zero on the scale of the thermometer. He discovered the two stars in Orion's belt. His "*Micrographia*" revealed the cellular structure of plants, and to him is due the first glimmer of the cell theory, although he did not state this generaliza-

tion or realize what his own accurate figures foreshadowed. His theories of light and of combustion were in line with modern hypotheses. Sir F. G. Hopkins in his "Foreword" supports the view that had Hooke known more mathematics he even might have forestalled Newton in his understanding of universal gravitation. Hooke's mind was analytical and his clarity of thinking placed his "*Micrographia*" and his "Cutlerian Lectures" among the foremost classics of scientific literature.

Leeuwenhoek was an industrious amateur, whose indomitable curiosity fired his zeal and whose pride urged him into undeserved notoriety. His discoveries were assembled higgledy-piggledy, without significant relations, and his secrets were guarded jealously. Hooke, on the other hand, associated himself with other brilliant minds, and his "*Micrographia*" reflected the powers both of analysis and of synthesis. He was not revealing an *arcanum* but was writing a logical account of a new field of knowledge.

The recognition which Hooke received at the hands of his associates is indicative of his intellectual power and of the confidence of his colleagues in his skill and judgment. In 1662, the second year after the foundation of the Royal Society of London, he was made its "Curator of Experiments," a post held throughout his life. This led to his contributing continuously to the meetings of the society. In 1663 he was made a fellow, and, succeeding Oldenburg in 1677, he was secretary to 1682. He edited the society's "*Philosophical Collections*." The "Diary" was given in 1701 to Richard Waller, who then was secretary of the Royal Society, and who appended this note:

Memorandum: Mr. Dillon the husband of Dr. Hooke's Neice who was Administratrix to Dr. Hook who dyed without a Will gave mee this MSS about December in the year 1708. he having found it amongst Dr. Hooks Papers. to whome and to his Wife I am obliged for the papers I had put into my hands of that great gen-

Dr. Hook. Dr. Hook who was as I could prove were it a proper time the first Inventor or if you please first Hinder of those things about which Magni Nominis Heroes have contested for the Priority.

R. W.

Later the "Diary" and other papers were used by the Rev. William Derham in the preparation of his "Philosophical Experiments and Observations of the late Eminent Dr. Robert Hooke" (1726). After that the "Diary" and other papers were passed into private hands and were bought by the Corporation of the City of London. It was loaned by them for the purposes of this edition.

A brief 16-page "Sketch of his Life" precedes the "Diary," which fills 470 pages and is followed by a list of taverns and coffee-houses mentioned in the diary and a biographical index of 57 pages of names cited by Hooke.

The diary covers the period from August 1, 1672, to May, 1683, but entries after 1679 are not included in this work because of many extensive interruptions in the later years and the lack of significant material.

The diary is wholly lacking in literary merit and has no eye to the future reader, as seemingly did that of Pepys. It is a terse, concentrated, matter-of-fact account of his personal routine, financial, official and

scientific. He was deeply interested in his own physiology, especially in the effects of his food and drink, and one sees how important in the scientific life of his day were the convivial meetings, where conversation and criticism stimulated thinking. He notes often the purchase and reading of books, scientific instruments, methods of flying, Leeuwenhoek's tadpoles and mites, and, in later years, his diverse services as surveyor for the City of London in directing rebuilding after the Great Fire of 1666.

It was fortunate that his "Micrographia" was published in 1665, for shortly afterwards his public services were so onerous that even the Royal Society became restive lest its scientific activities be restricted thereby. His "Diary" was written during this period of divided attention given to the architectural service of the city, the professorship of geometry in Gresham College and the secretaryship of the Royal Society. The "Diary" reveals his inventiveness; his ingenuity along mechanical lines; his wide interests in chemical matters stimulated, doubtless, by years of association with Robert Boyle as his assistant; his wide acquaintanceship with scientific men of his day; and his unusual and remarkable versatility.

CHARLES A. KOFOID

REPORTS

DESTRUCTION OF THE GREAT WESTERN RANGES

A REPORT entitled "The Western Range," U. S. Government Printing Office, 1936, has been transmitted to the United States Senate by the Secretary of Agriculture in response to Senate Resolution 289 (74th Cong. 2d. sess.) reading as follows:

Whereas large parts of the western range have been subject to unrestricted use since settlement and are commonly believed to be more or less seriously depleted; and

Whereas the Department of Agriculture has through many years of research and of administration of the national forests accumulated a large amount of information on the original and present condition of the range resource, the factors which have led to the present condition, and the social and economic importance of the range and its conservation to the West and to the entire United States: Therefore be it

Resolved, That the Secretary of Agriculture be, and hereby is, requested to transmit to the Senate at his earliest convenience a report incorporating this information, together with recommendations as to constructive measures.

The report was prepared by the U. S. Forest Service with the cooperation of other government and state agencies. It is the first attempt to treat the range resource as a whole and presents an unusually clear

picture of the destruction of land and water resources resulting from unwise use of range lands. It is a book of 620 pages well illustrated.

One of the primary reasons for neglect, and hence the serious depletion of the range resource and a series of major maladjustments in land use, has been a division of responsibility among public agencies.

That this division of responsibility must be corrected before satisfactory progress can be made in formulating and in putting into operation a long time program is made evident by the facts presented.

Among the high lights of the report the following are of special interest.

The range area of 728 million acres is nearly 40 per cent. of the total land area of the continental United States; more than 99 per cent. is available for live stock grazing.

About half the range area is in private ownership.

Three fourths of the entire range area has declined during the last 30 years, and only 16 per cent. has improved.

About seven tenths, or 523 million acres, of the range area is still subject to practically unrestricted grazing.

No less than 589 million acres of range land is eroding more or less seriously, reducing soil productivity and im-

pairing watershed service. Three fifths of this area is adding to the silt load of major western streams.

It will probably require more than 50 years of management to restore the depleted range sufficiently to carry even the 17.3 million livestock units now grazed and probably an additional 50 years to restore it to the nearest possible approach to its original grazing capacity of 22.5 million units.

Action of greatest immediate urgency and importance is to—

Stop soil and forage depletion, and start both on the upgrade;

Reduce excessive stocking, place all range lands under management, and restore cheap range feed;

Rectify land ownership and use maladjustments, and obtain a sound distribution of ownership between private and public agencies;

Build up economic private and public units;

Balance and integrate crop and range use;

Correlate the livestock, watershed, forest, wildlife, and recreation forms of range-land uses and services;

Obtain a recognition of the responsibility of stewardship by private owners;

Minimize or remove various financial handicaps of stock producers;

Reconcile range conservation and the financial needs of State institutions;

Solve the tax delinquency problem;

Place public lands under the supervision of agricultural agencies as a step toward unification of public responsibility for the entire range problem. Provide on such lands for a sound distribution of grazing privileges, and prevent the establishment of prescriptive rights;

Obtain and apply the information necessary for the conservation and wise use of the range resource;

Prevent human wastage and insure social and economic security.

This report should be studied in connection with the symposium "Scientific Aspects of Flood Control," sponsored by the Ecological Society of America and the American Association for the Advancement of Science at the Rochester meeting of the association. The papers presented in this symposium were of such outstanding value that they are being issued with illustrations as a supplement to *SCIENCE* in the Occasional Paper Series of the American Association for the Advancement of Science. They will be invaluable to all interested in soil conservation and flood control.

A. F. WOODS

SPECIAL ARTICLES

SOME RESULTS OF INVESTIGATIONS ON *POLYPORUS SCHWEINITZII* FR.

IN July of 1928, while forest pathologist in the New York State Conservation Department, the senior writer's attention was called to a resinosis disturbance which was present in the root crown and in the roots of northern white pine (*Pinus strobus* L.) in forest plantings at Norwich, N. Y. A year later, there was reported to him a similar condition in the municipal forest plantings of the city of Rochester, N. Y., located along Hemlock and Canadice Lakes. Preliminary surveys of these situations showed that, although the disease was making very rapid progress, the cause was quite obscure. The plantings along Hemlock Lake, where the disturbance was most severe, were established from 1910 to 1914 on abandoned fields. All the stock had been grown from seed in the nurseries of the New York State Conservation Department. Imported white-pine seedlings had been grown a few years previously in some of these nurseries which have since been abandoned. This fact suggested the possibility that a parasitic fungus of foreign origin might have been introduced into the nursery soil and spread to various places in the state on stock grown from seed in these nurseries.

Intensive investigations of the cause of this disturbance were begun in the summer of 1930 by the senior writer and have been conducted largely in the region

of Hemlock and Canadice Lakes. Reddish streaks suggestive of incipient decay were observed occasionally in the central part of some of the "resinosed" roots; many cultures from these discolored regions failed to yield any organism known to cause the decay of wood; bacteria were the only organisms present in the majority of the cultures.

In August, 1932, a single sporophore which resembled *Polyporus Schweinitzii* Fr. was found, but it was so imperfectly developed that a species determination was impossible. It was attached to the base of a living tree which showed little evidence of resinosis. In the summer of 1933, sporophores of *P. Schweinitzii* were occasionally observed near the base of dead and diseased white-pine trees in an eleven-acre tract along Hemlock Lake. Sporophores of this fungus were quite abundant in this and two other plantings in the summer of 1935. The earliest date on which a perfect sporophore of *P. Schweinitzii* has been observed in this locality was June 6, 1935. With this discovery of *P. Schweinitzii*, the senior author then sought to determine whether the resinosis was caused by this organism or if it was due to some other pathogene. Hundreds of cultures from the "resinosed" lesions failed to yield *P. Schweinitzii*, but a grayish-black fungus developed in approximately 75 per cent. of these cultures; all efforts to induce the latter to fruit have been unsuccessful. Thus it would seem that no direct connection

exists between the resinosis disturbance and the injury caused by *P. Schweinitzii*, since the trees attacked by the latter may never show any, or very little, evidence of resinosis.

No sporophores of *P. Schweinitzii* have thus far been found in the plantings at Norwich, even though hundreds of trees have died from resinosis. The roots of trees which die from this disease may never show any traces of the reddish streaks. Resinosis has been found to be most severe where the pH of the soil is 6.0, or above, and the colloidal content 52 per cent. or more. Even though *P. Schweinitzii* has been found to be very abundant in such areas, it is also causing very severe damage where the pH of the soil is around 5.5 and the colloidal content varies from 46 to 50 per cent. or even less. The resinosis disease is of minor importance, as contrasted with the damage which is being caused by *P. Schweinitzii*.

Advanced stages of decay in the roots of living trees of white pine due to *P. Schweinitzii* were first observed in the summer of 1933. By the end of the summer of 1934, this root rot was found to be very wide-spread in plantings totalling about 1,200 acres of white and red pine in the Hemlock Lake region. Living trees whose roots were badly rotted had begun to fall over and have continued to fall in increasing numbers. At the present rate of destruction, not a single tree in this area will reach merchantable size. The losses from the damage caused by *P. Schweinitzii* along Hemlock and Canadice Lakes are the most serious which have thus far been reported in forest plantings in the United States, if not in the world. *P. Schweinitzii* was reported in 1925 as causing root rot in forest plantings of Douglas fir near Biltmore, N. C.¹

Chemical analyses of soil extracts show that in plantings where *P. Schweinitzii* is present there is nearly 21 per cent. more calcium in the upper four inches of the soil than where the organism is not known to occur. A number of chemical analyses of the ash of the wood of infected trees show less calcium present than in the wood of normal trees. It occurred to the senior author that the activities of *P. Schweinitzii* in the soil may render the calcium less available to the trees.

Chemical analyses of a water extract of silica quartz sand from around the roots of three-year-old seedlings of eastern white pine in pot cultures, which were inoculated with *P. Schweinitzii* and supplied with a given nutrient by Wean's method,² showed twenty-five times more calcium where the fungus was present than in the controls. These cultures and inoculations were made by Wean while a graduate student in forest pathology at the University of Pennsylvania. He

found that *P. Schweinitzii* was highly parasitic on the roots of one- and three-year-old seedlings of white pine. The hyphae readily penetrated both the epidermal and peridermal layers, especially in pot cultures with nutrient solutions at a pH of 6.0 and 7.0 and under conditions of a reduced supply of phosphorus. Reddish streaks were present in the central part of infected roots which were even less than two millimeters in diameter. These results are indicative of the possibility that *P. Schweinitzii* may be distributed in nursery stock.

In view of the possibility that *P. Schweinitzii* as found in the Hemlock Lake region might be of foreign origin, Childs, while a graduate student in forest pathology at the University of Pennsylvania, worked with cultures of this organism from various parts of the world, including many from the Hemlock Lake area. At present, it appears that *P. Schweinitzii*, which is causing root and butt rot in the forest plantings in question, is purely of local origin. He has found that within *P. Schweinitzii* there are a great many individuals which, when grown under a given set of conditions, show a wide range of cultural reactions. He has also found that a number of these individuals are definitely homothallic and fruit readily in culture; clamp connections have not been observed in any of these cultures.

HARLAN H. YORK
ROBERT E. WEAN
THOMAS W. CHILDS

UNIVERSITY OF PENNSYLVANIA

PROLONGATION OF THE CORPUS LUTEUM IN THE PSEUDOPREGNANT RABBIT

IN the course of some experiments designed to study the effects of prolonged action of oestrin and progesterin on the rabbit's uterus, it became necessary as one type of control experiment to inject oestrin for several days beginning on the eleventh day of pseudopregnancy. Under these conditions we were surprised to find that the corpora lutea persisted in a healthy state much longer than usual as judged by microscopic studies. The many possibilities of this finding have not as yet been fully explored, but by the continued injection of appropriate amounts of oestrin we have been able to prolong the corpora for as long as 25 days after a sterile mating.

Corpora prolonged by this means appear to be functional; the uterus remains refractory to pituitrin for as long as 21 days after mating, and the mammary glands do not regress as they do normally at the end of pseudopregnancy. Further, when the ovaries are removed at either the sixteenth or twenty-fifth day, but the oestrin continued at the same or increased level, lactation has occurred in every case and nesting in sev-

¹G. G. Hedgecock, G. F. Gravatt and R. P. Marshall, *Phytopathology*, 15: 568-569, 1925.

²Robert E. Wean, *SCIENCE*, 82: 336, 1935.

eral cases within three or four days of the time of castration. In no case, however, has the mammary gland been as thick as that obtained at the end of pregnancy, the thickest lactating gland obtained by this means being about one third as thick as glands obtained at parturition or a few days before.

No attempt has been made to assay the pituitaries in these rabbits to see what effect the oestrin may have had on them, but it is probable that the effect on the corpora is an indirect one, since many observers have shown that oestrin alters the gonadotropic activity of the pituitary.

These findings may explain the persistence of the corpora lutea during pregnancy in the rabbit. We have assumed, as many others working in the field of reproduction undoubtedly have also, that during pregnancy the placenta elaborates a gonadotropic hormone which, either directly or indirectly through the pituitary, causes the corpora to persist. This assumption is not based on direct evidence from the rabbit but rather by analogy because of the finding of pituitary-like substances in human pregnancy urine and placenta. In the light of these experiments it is much more likely that in the rabbit the placenta elaborates oestrin and that this rather than a placental gonadotropic hormone causes the corpora to persist.

WILLARD M. ALLEN
GEORGE P. HECKEL

SCHOOL OF MEDICINE AND DENTISTRY,
UNIVERSITY OF ROCHESTER

SOME POSSIBLE EFFECTS OF NURSING ON THE MAMMARY GLAND TUMOR INCIDENCE IN MICE¹

FOLLOWING the publication² by the staff of the Jackson Memorial Laboratory (1933) on the extra-chromosomal influence in the etiology of breast tumors, several experiments were designed in an attempt to determine the basis of such an effect. In this note the writer presents a preliminary report on the foster-nursing of the young cast by females of a high mammary gland tumor line by females of a low tumor stock and its possible effects on the incidence of that type of tumor.

Three litters of mice from the inbred A strain of mice, which has a mammary gland tumor incidence of 88 per cent.,³ were fostered by females of the X stock (Strong's CBA race). The breast tumor incidence in the latter strain is approximately 10 per cent. The young were removed from their A stock mothers as soon as noticed—none were more than twenty-four hours old.

¹ Preliminary report.

² Staff, Jackson Memorial Laboratory, *SCIENCE*, 78: 465, 1933.

³ J. J. Bittner, *Amer. Jour. Cancer*, 25: 791, 1935.

In the three litters of fostered A stock mice were nine females. They were used as breeders as well as forty of their progeny. Hence, the mice were subjected to all the irritation factors considered essential for the development of breast tumors in individuals having such an inherited constitution.

Of the nine A stock females fostered by CBA stock females, three developed mammary gland tumors, four had primary lung tumors and two died non-tumorous. Among 40 of their progeny which were not fostered, there were observed 12 with breast tumors only, two with breast and pulmonary cancers, 13 with primary lung tumors and 13 died non-tumorous. The proportion for each group was 30.6 per cent., 4.1 per cent., 34.7 per cent. and 30.6 per cent., respectively. The average age at death or observation of the various classes was: breast cancer, 12 months; lung cancer, 17 months; and non-cancer, 15 months.

Ten of the 13 progeny of fostered females which had breast cancer developed similar growths as compared with four of the 24 progeny from fostered females which had lung tumors. The respective proportions were 77 per cent. and 17 per cent.

The three fostered litters were descended from one subline of the A stock. All had from 16 to 18 successive generations of mammary gland tumors in their direct ancestry. Prior to the birth of the litters 70 mice had been observed, of which 92.3 per cent. had developed breast tumors. In later generations 210 mice, exclusive of the fostered females and their progeny, have died from various causes. The proportion developing mammary carcinoma was 88.1 per cent.

While the number of animals used in the preliminary work has been small, a larger group of females fostered by C₅₇ Black stock mice are giving observations which are indicative of similar results. Should further study demonstrate that the incidence of mammary gland tumors in mice may be affected by nursing, an explanation may be offered for the so-called extra-chromosomal influence as a cause in the development of this type of neoplasm.

JOHN J. BITTNER

JACKSON MEMORIAL LABORATORY
BAR HARBOR, MAINE

BONE ASH IN PREVENTION AND HEALING OF EXPERIMENTAL RAT RICKETS

THE very extensive use of rickets curative technique in judging the effects of vitamin D in both rats and human subjects, where the conclusions are based on subjective estimates of the degree of healing, makes it desirable to supplement the information, if possible, with more objective measurements.

The ash content of the normal rat femur (stock diet)

7 weeks of age is about 56 per cent. A rat of similar having been on a rachitogenic (Steenbock) diet for 3 weeks has a femur ash which varies somewhat with rat strain, season, etc. In the experiments reported here the mean value was 30 per cent., ranging from 24 to 34 per cent. When ample Vitamin D was given during the three weeks on the rickets-producing diet, the bone ash did not rise above a mean of 50 per cent. (49 to 52 per cent. in groups of about 10 animals); with added phosphate, however, the bone ash values clustered very closely about the normal 56 per cent. The 50 per cent. bone ash level was attained with 0.5 U.S.P. unit of D per day. Several times higher Vitamin D intake produced no further increase. Dose action curves over a significant range have been worked out.

Ten-day curative experiments carried out as Vitamin D assays (U.S.P. technique) gave the following results. A definite fairly wide continuous line of recalcification (++) on our scale) raised the bone ash to no higher than a mean value of 34 per cent., with about the same variation as applied to the 30 per cent. value for negative controls. Effects of this magnitude are commonly produced by 0.2 to 0.3 units of D per day. Distinctly visible recalcification but less than the ++ healing gave extremely variable bone ash values and

very poor correlation with the visual picture. In several groups no increase whatever was shown in bone ash when mean values were compared. Fifty or a hundred times the dose which produced a ++ healing did not raise the bone ash above 40 per cent., although the silver stained bone showed the entire previously rachitic area filled with dense newly formed calcified trabeculae.

It is indicated therefore that in curative experiments a definite effect noted visually may correspond to but a small fraction of the healing process, and that what is considered very substantial healing effects raise the bone ash through only about one fifth of the interval between the rachitic and the full Vitamin D prevention levels. One hundred times this dose raises the bone ash half way towards the prevention level. Any further increase requires more time.

Besides these planned experiments, observations on more than 400 bones from assay studies, mostly on cod liver oil concentrates but also including other forms of Vitamin D, verify this picture. It is not surprising to find that the variation in bone ash values increases, the further they are removed from normal.

THEODORE F. ZUCKER

COLLEGE OF PHYSICIANS AND SURGEONS
COLUMBIA UNIVERSITY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

PREPARATION OF METHIONINE-FREE NATURAL LEUCINE

In a recent note in *SCIENCE*, Mueller¹ pointed out that commercial l-leucine is contaminated with methionine. The presence of a sulfur-containing impurity was recognized by Emil Fischer² in 1900. Unsuccessful attempts to purify natural l-leucine have included: the amino-acid ester method, repeated recrystallization from water, electrodialysis, precipitation of methionine as mercury complex and recrystallization from acidified butyl alcohol. Recrystallization of the formylated amino-acid has now been found, however, to yield a sulfur-free leucine without appreciable racemization.

Mixtures of l-leucine samples containing 2.6, 5.5 and 8.0 per cent. methionine were formylated by the methods of Fischer and Warburg³ and of Steiger.⁴ Two recrystallizations from water rendered the formyl-leucine practically sulfur-free, as determined by combustion sulfur analysis. For purposes of precise calorimetry, these samples were recrystallized from water four more times. The formyl-leucine was then

decomposed by refluxing one hour with ten cc of 10 per cent. HBr per gm of formyl-leucine, and most of the excess acid removed by evaporation *in vacuo*. After solution of the residue in water, the evaporation was twice repeated. The final residue was dissolved in a little water, neutralized with conc. NH_4OH , chilled, and the crystals were filtered off. The leucine was washed with alcohol until halide-free, and finally recrystallized from water.

The yield of leucine from original crude material, after six recrystallizations of formyl body, was 50 per cent. The product was sulfur-free and ash-free. The specific rotation, in 20 per cent. HCl, checked that of l-leucine obtained by synthesis and resolution.

S. W. Fox

CALIFORNIA INSTITUTE OF TECHNOLOGY

A DIFFERENT PRINCIPLE IN THE CONTINUOUS RENEWAL OF CULTURE SOLUTION

DURING the past fifteen years numerous pieces of apparatus have appeared that were planned to deliver culture solutions at a uniform rate. Several of these employ the principle of dripping from a nearly constant level in order that the rate of drip be uniform.

¹J. H. Mueller, *SCIENCE*, 81: 50-51, 1935.

²E. Fischer, *Ber. chem. Ges.*, 33: 2372, 1900.

³E. Fischer and O. Warburg, *Ber. chem. Ges.*, 38: 3998, 1905.

⁴R. E. Steiger, *Jour. Biol. Chem.*, 86: 695, 1930.

While conducting solution culture experiments during last year, the author found that by the principle of maintaining the dripping unit at the changing level of the solution in the reservoir of fresh solution, the problem was simplified. A most uniform, continuous flow may be accomplished in this way. Fig. 1 shows the construction of the apparatus employed in this work.

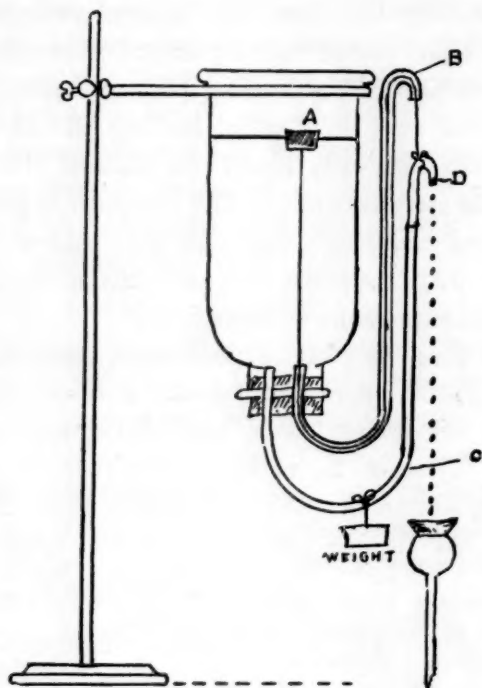


FIG. 1

In this apparatus a piece of paraffined twine passes from the cork float *a* to the bottom of the reservoir, then through a stationary tube *b*, and is fastened to the dripping unit *d*. The dripping unit *d* descends at the same rate as the level of the solution in the reservoir, since it takes up the slack of the cord which leads from the float *a*. The descent of the dripping unit is made possible by a rubber tube connection *c*, bearing a small weight.

This apparatus combines simplicity of construction with a readily adjustable flow of solution. Neither capillary tubing nor clamps are required in its construction. Air bubbles are carried through a thistle tube¹ into the culture jar with the drops of solution, thereby providing a constant oxygen supply for the plant roots.

The author wishes to express appreciation to Mr. C. W. Myers for making the diagram in Fig. 1.

ROBERT P. MARSH

GETTYSBURG COLLEGE

A CONVENIENT RETRACTOR FOR USE IN OPERATIONS AND DISSECTIONS OF SMALL-SIZED ANIMALS

THE following instrument is recommended for use as holder or retractor in operations and other manipu-

¹ R. P. Marsh, *SCIENCE*, 82: 256, 1935.

lations on small objects: Into the top of a rubber vacuum suction cup (about 1 inch in diameter) a glass rod is fitted. The rod is bent into a horizontal position, drawn out to a suitable width, and its end shaped into a hook, as shown in the diagram.

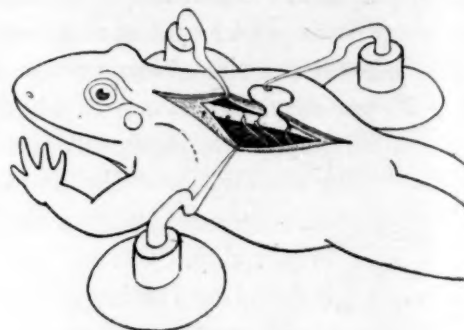


FIG. 1

moistened cup, when pressed against the polished surface (glass, enamel, bakelite, etc.) on which the animal rests, sticks for any length of time, giving the holder a firm hold, with enough elasticity to prevent injury to the retracted tissues. Horizontal adjustments are effected by sliding the cup along the table surface. Vertical adjustments within narrow limits can be obtained by pressing the cup more or less tightly against the table. If vertical adjustments of greater extent are desired, the glass hook should be mounted on a metal cuff sliding up and down a metal rod inserted into the top opening of the rubber cup. Skin, muscles, blood vessels, nerves, etc., can thus be conveniently gripped and retracted so as to give free vision and access into the deeper fields of the operation.

With appropriate modifications the instrument can be used for many other purposes in the laboratory, for instance, as holder for stimulating electrodes.

PAUL WEBB

HULL ZOOLOGICAL LABORATORY,
THE UNIVERSITY OF CHICAGO

BOOKS RECEIVED

- DRESDEN, ARNOLD. *An Invitation to Mathematics*. xiii + 453. Holt. \$2.80.
- FILON, L. N. G. *A Manual of Photo-Elasticity for Engineers*. Pp. xi + 140. 27 figures. Macmillan, The Macmillan Company. \$1.50.
- HEISER, VICTOR. *An American Doctor's Odyssey: Adventures in 45 Countries*. Pp. viii + 544. Norton. \$3.00.
- HILL, M. A. and J. BURTON LINKER. *First Year College Mathematics*. Pp. xvi + 155. Holt. \$2.60.
- MORRISON, F. B. *Feeds and Feeding: A Handbook for the Student and Stockman*. 20th edition, unabridged. Pp. vi + 1050. Illustrated. Morrison Publishing Co. Ithaca, N. Y.
- ROSSELAND, S. *Theoretical Astrophysics; Atomic Theory and the Analysis of Stellar Atmospheres and Environments*. Pp. xix + 355. 46 figures. Oxford University Press. \$8.00.
- VIGOREUX, P. and C. E. WEBB. *Principles of Electrostatic and Magnetic Measurements*. Pp. xi + 392. Princeton University Press. \$5.00.